

Application No. 10/064,757
Attorney Docket No. 125691-3 (13591US03)

REMARKS

The present application includes claims 1-21 and 23-35. Claims 1-21 and 23-35 were rejected by the Examiner. By this Amendment, claims 12, 23-25, and 27 have been amended.

Claims 1-3, 5, 6, 8, 11-20, and 23-35 were rejected under 35 U.S.C. §102(b) as being anticipated by Toki et al., U.S. Patent No. 5,594,772.

Claims 4, 7, 9, and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Toki et al., U.S. Patent No. 5,594,772, in view of Heuscher et al., U.S. Patent No. 6,510,337.

Claim 21 was rejected under 35 U.S.C. §103(a) as being unpatentable over Toki et al., U.S. Patent No. 5,594,772, in view of Boyd, U.S. Patent No. 4,352,021.

The Applicant now turns to the rejection of claims 1-3, 5, 6, 8, 11-20, and 23-35 under 35 U.S.C. §102(b) as being anticipated by Toki et al., U.S. Patent No. 5,594,772.

Toki relates to a computer tomography apparatus. More particularly, Toki relates to a method for "acquisition of tomographic image data corresponding to a specific heartbeat phase or respiration phase" (col. 14, lines 44-47).

Toki describes selecting a single trigger event, not multiple trigger sequences. More particularly, Toki describes selecting a threshold value or specific amplitude of a heartbeat or respiration waveform signal with an input means, such as a push-button

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switch, joystick, or mouse (col. 14, lines 48-62). The threshold value is set based on a desired heartbeat or respiration phase (col. 15, lines 39-49). Alternatively, the threshold value may be set based on a desired tomographic image, which is then linked to a corresponding heartbeat or respiration waveform signal for future scans (col. 15, lines 13-38).

Additionally, Toki describes initiating multiple CT scans based on a single fixed trigger event, not multiple independently configurable trigger sequences. In reference to Figure 14 of Toki, “[t]he synchronization controller 73 compares the heartbeat waveform signal or respiration waveform signal with the threshold value signal from the threshold value setting unit 74, and outputs a synchronization signal to the scan controller 70 at each timing at which the amplitude of the signal has reached the threshold value” (col. 15, lines 60-65). More particularly, in reference to Figures 15A and 15B of Toki, “[t]he scan controller 70 starts the X-ray radiation and data acquisition at reception timings t1, t2, ... of the synchronization signal” (col. 15, lines 65-67).

Consequently, Toki does not teach or disclose multiple independently configurable trigger sequences. Rather, Toki triggers at the same trigger event in a heartbeat or respiration waveform over multiple CT scans.

Claims 1 and 19 recite multiple independently configurable trigger sequences. Additionally, claims 12 and 27 have been amended to recite multiple independently configurable trigger sequences.

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Therefore, the Applicant respectfully submits that independent claims 1 and 19, amended independent claims 12 and 27, and corresponding dependent claims 2, 3, 5, 6, 8, 11, 13-18, 20, 23-26, and 28-35 are in condition for allowance.

The Applicant now turns to the rejection of claims 4, 7, 9, and 10 under 35 U.S.C. §103(a) as being unpatentable over Toki et al., U.S. Patent No. 5,594,772, in view of Heuscher et al., U.S. Patent No. 6,510,337.

Heuscher does not overcome the shortcomings of Toki, as described above. Specifically, Heuscher does not teach or disclose multiple independently configurable trigger sequences.

Heuscher relates to a multi-phase cardiac imager. More particularly, Heuscher relates to a method of cardiac gating for locating a selected cardiac phase within the cardiac cycle (col. 2, lines 2-11).

Like Toki, Heuscher also describes selecting a single trigger event, not multiple trigger sequences. Heuscher describes selecting a desired cardiac phase of interest (col. 2, line 2-11), or trigger event. More particularly, after the trigger event, or desired phase of the heart to be located and/or imaged, is "selected, a delay D is calculated for the corresponding cardiac phase based on the instantaneous heart cycle time and the compliance" (col. 6, lines 36-49). In reference to Figure 1 of Heuscher, "the scan controller 90 triggers operation of the scanner 10 after a delay period D following each R-wave peak such that image data corresponding to a specific to the cardiac cycle of

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interest is generated by the CT scanner 10 and acquired from the detectors 40" (col. 8, lines 62-66). "For example, if the aim is to acquire images during the end-diastolic phase, the [delay] can be calculated and used as input to then generate a trigger at the appropriate time based on the current heart rate" (col. 8, lines 4-7).

Additionally, Heuscher describes initiating multiple CT scans based on a single fixed trigger event, not multiple independently configurable trigger sequences. Heuscher does not teach or disclose a fixed delay for identifying when the heart is at a given phase in the cardiac cycle (col. 1, lines 41-46). Rather, Heuscher describes a variable delay. More particularly, "[f]rom cycle to cycle, each calculated D can then be used to accurately and consistently identify, locate and/or image the cardiac phase to which it corresponds" (col. 6, lines 46-49). However, as described above, the selected trigger event, or desired cardiac phase of interest, is distinct from the delay and remains fixed between cardiac cycles (col. 2, lines 2-11). More particularly, Heuscher provides that "consistent identification and imaging of the same desired heart phase from cycle to cycle in a patient" is particularly advantageous (col. 2, lines 31-34).

Consequently, Heuscher does not teach or disclose multiple independently configurable trigger sequences. Rather, Heuscher triggers at the same trigger event in a cardiac cycle over multiple CT scans.

Claims 4, 7, 9, and 10 depend from claim 1, which recites multiple independently configurable trigger sequences. As described above, claim 1 is allowable over Toki.

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Therefore, the Applicant respectfully submits that dependent claims 4, 7, 9, and 10 are also in condition for allowance.

The Applicant now turns to the rejection of claim 21 under 35 U.S.C. §103(a) as being unpatentable over Toki et al., U.S. Patent No. 5,594,772, in view of Boyd, U.S. Patent No. 4,352,021.

Boyd does not overcome the shortcomings of Toki, as described above. For example, Boyd does not teach or disclose multiple independently configurable trigger sequences.

Boyd relates to an x-ray transmission scanning system and method and electron beam x-ray scan tube for use therewith. More particularly, Boyd relates to a method of triggering CT scans for determining regional myocardial perfusion and blood flow in coronary arteries and cavities (col. 5, lines 54-68, col. 6, lines 1-50).

Like Toki, Boyd also describes a single trigger event, not a trigger sequence. More particularly, Boyd describes triggering CT scans from a physiological signal from the heart (col. 5, lines 59-62) based on an appropriate physiological signal (col. 6, lines 32-33). A trigger event based on an appropriate physiological signal is not a trigger sequence.

Additionally, Boyd describes a single fixed trigger event, not multiple independently configurable trigger sequences. More particularly, Boyd requires that a trigger event always be the same for a given set of scans. "The exact phase of the cardiac

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cycle selected for scanning is not critical as long as the timing is repeatable from beat to beat" (col. 5, line 68, col. 6, lines 1-2).

Consequently, Boyd does not teach or disclose multiple independently configurable trigger sequences. Rather, Boyd triggers at the same trigger event in a cardiac cycle over multiple CT scans.

Claim 21 depends from claim 19, which recites multiple independently configurable trigger sequences. As described above, claim 19 is allowable over Toki. Therefore, the Applicant respectfully submits that dependent claim 21 is also in condition for allowance.

Claims 12 and 23-25 have been amended to correct clerical errors. More particularly, with regard to claim 12, the language "said trigger sequence" was unintentionally repeated in the prior Amendment, dated February 24, 2005, and is now deleted from claim 12 by this Amendment. Additionally, with regard to claims 23-25, the language "19" was added, but not underlined in the prior Amendment, and is now properly reflected in claims 23-25 by this Amendment. No new matter was added, nor was the scope of the claims changed by this Amendment. Therefore, the Applicant respectfully submits that claims 12 and 23-25 are in condition for allowance.

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CONCLUSION

If the Examiner has any questions or the Applicant can be of any assistance, the
Examiner is invited and encouraged to contact the Applicant at the number below.